STATE OF NEW YORK

DIVISION OF TAX APPEALS

In the Matter of the Petition	:	
of	:	
UNION CARBIDE CORPORATION	:	DETERMINATION DTA NO. 809943
for Revision of a Determination or for Refund of Sales and Use Taxes under Articles 28 and 29 of the Tax Law for the Period April 1, 1983 through June 30, 1986.	:	

Petitioner, Union Carbide Corporation, 39 Old Ridgebury Road, Danbury, Connecticut 06817-0001, filed a petition for revision of a determination or for refund of sales and use taxes under Articles 28 and 29 of the Tax Law for the period April 1, 1983 through June 30, 1986.

A hearing was held before Arthur S. Bray, Administrative Law Judge, at the offices of the Division of Tax Appeals, 500 Federal Street, Troy, New York, on October 19, 1993 at 9:30 A.M., with all briefs to be submitted by January 22, 1994. Petitioner filed its briefs on December 14, 1993 and January 21, 1994. The Division of Taxation filed its brief on January 4, 1994. Petitioner appeared by Robert A. Fiscella, Esq. The Division of Taxation appeared by William F. Collins, Esq. (John O. Michaelson, Esq., of counsel).

ISSUE

Whether the computer-aided design engineering system purchased by Union Carbide Corporation during the audit period qualifies for an exemption from sales and use taxes under Tax Law § 1115(10) and 20 NYCRR 528.11 as equipment used predominantly "in research and development in the experimental or laboratory sense."

FINDINGS OF FACT

Petitioner, Union Carbide Corporation, operates a large facility in Tonawanda, New York, known as the Linde Gas Division of Union Carbide. It engages in the business of designing industrial gas plants and selling atmospheric gases to various customers. In most instances, the plant is owned by Union Carbide and petitioner sells the gas.

During the period in issue, petitioner expanded its Computer Aided Design Engineering System ("CADE system") in order to assist in its design of industrial gas plants. The Capital Budget Proposal pertaining to the expansion of the CADE system explained that the "CADE system would allow the application of CADE technology to all major activities of Air Separation Plant Design Engineering."

The CADE system represented an advancement in the prevailing technology with respect to the design and analysis of air separation plants or industrial gas plants. It is analogous to a PC network, except that the CADE system is used for engineering analysis rather than for word processing or simpler applications. The CADE system includes floor computers, desk top terminals, plotters, graphic presentation equipment and related software, equipment and articles dedicated to the foregoing activities.

Petitioner paid sales and use tax on the purchase of the CADE system and thereafter filed an Application for Credit or Refund of State and Local Sales or Use Tax in the amount of $273,541.08. In a letter dated September 20, 1989, petitioner's claim for refund was denied on the ground that the CADE system was used largely in design engineering and not research and development. Following a conciliation conference before the Bureau of Conciliation and Mediation Services, which denied the request, petitioner filed a petition with the Division of Tax Appeals which contested the denial of the refund claim to the extent of $162,721.40, plus interest. At this juncture, the only matter in issue is whether petitioner's purchase of the CADE system is subject to sales and use taxes.

There are a variety of facilities that use petitioner's services, including industrial plants such as steel mills, chemical plants or glass making facilities. Petitioner would also design and custom build a plant in order to supply a hospital with oxygen. Most of the facilities that petitioner designs and builds using the CADE system address specific customer requirements and are therefore custom designed.

The facilities designed by petitioner are unique because they depend on the type of gas that is used, the purity of the gas, the phase of the gas, the geographic location and the

atmospheric conditions. For example, other things being equal, a plant in Denver and a plant in Houston would be different because barometric pressure and humidity are different.

In designing a plant, one has to proceed through a considerable search to find the routing and parameters that will satisfy the thermal and mechanical requirements. The optimal solution is arrived at through a trial and error process which consumes the most significant portion of the time that one is using the system. For example, if the question concerns a piece of pipe, one is concerned about energy utilization and its relationship to pressure, the material, wall thickness and the diameter that will satisfy the stress requirements. The production of the drawing uses a relatively small amount of time. Ultimately, petitioner is trying to design a plant that meets a customer's needs, design specifications and is economical to build.

Each plant is different. In the past 18 years, there has been only one customer that purchased two plants with the intention that they be identical. Thereafter, petitioner tried to make them identical. However, because of utility considerations and differences in locations (Ohio versus Pennsylvania), there were significant design differences. Even in this case, petitioner had to proceed through the same step-by-step analysis and could not simply reuse the design developed for the first plant.

The CADE system is involved in the analysis and documentation of the design. As a last step, after the drawings are produced, they are furnished to contractors who bid on the construction of the plant. The CADE system is not involved in the building of the plant.

Petitioner has a Research and Development Department which operates independently of the Engineering Department. The Research and Development Department develops fundamental technology in terms of air separation. For example, one project of the Research and Development Department was the design of a liquid hydrogen trailer which could carry 16,000 gallons of liquid hydrogen while the previous state-of-the-art trailer could carry only 7,800 gallons.

The Engineering Department is separated from the Research and Development Department because the motives are different. In Research and Development, new technology

is discovered. In engineering, the technology is applied to economic uses. Nevertheless, the Engineering Department sometimes obtains patents on its work.

The Research and Development Department and the Engineering Department are similar in that the same scientific principles are applied. However, the Research and Development Department is not geared toward a specific project, whereas the Engineering Department is directed towards a specific customer or project. Except in the area of turbo machinery design, the Research and Development Department did not use the CADE system.

As a framework for analysis, petitioner provided an outline which described the tasks performed by the various departments using the CADE system and the percentage of time that each department uses the system on that task. To the extent that the items were in issue at the hearing, portions of this framework are set forth below in conjunction with other evidence adduced at the hearing.

(a)(1) Under the title of Control Systems Engineering and the subtitle of calculations, petitioner asserted that the following items are exempt from tax:

"Item	Description	Dept. % Use
C.1.A Orifices, Annubar & Flow Tube Sizing	It is the responsibility of the Engineer to optimize the performance of all the flow measuring devices in plant process streams. The procedure requires a trial and error analysis of the effects on the devices' performance when the design parameters change for varying plant operating points. For each pressure, temperature and flow relation the resultant signal level vs control response must be analyzed. The purpose is to achieve the best signal possible with a reliable control response to the process change. It is the manipulating of these parameters that will produce the final design definition for these devices.	5%
C.1.B	Automatic valves are the final	8%

Automatic Valve Sizing	control elements in process control. They adjust the process based on the operating parameters entered into the system by the Plant Operations Personnel. The interaction of the process measuring devices, the control devices and the final control element must be synchronized to provide the optimal performance for the system. The Engineer must perform an automatic valve sizing calculation for each operating point that each valve will see in the course of plant operation. The valve must have the required capacity to control the design flow and yet provide a rangeability to meet all operating conditions. Through a trial and error procedure the Engineer determines the optimal valve design and size to meet all process requirements."

(2) In order to satisfy the requirements of a particular customer, petitioner has to go through and provide the proper control and flow measurement devices. The engineer uses the CADE system to develop the designs and sizes taking into account the physical configuration of the piping. In the past, petitioner had less than an optimal configuration which was not nearly as efficient. It was also subject to larger fluctuations.

(3) Petitioner considered items C.1.A. and C.1.B. exempt from tax under 20 NYCRR 528.11(b)(1) because they were used to develop new products and/or improve existing products. The Division's Law Bureau, in a memorandum dated August 7, 1989, considered the foregoing items taxable for the following reasons:

"C.1.A.	Applying known equations to Varying conditions is applied engineering, not R & D.
"C.1.B.	Although the write-up is unclear, it appears merely to be sizing up the right valve, and the like; i.e., applied engineering, not R & D."

(b)(1) Under the category of Control Systems Engineering, petitioner listed steps to

"update and/or develop instrumentation drawings to reflect new or improved control philosophies" as follows:

"Item	Description	Dept. % Use
C.2.A. Process & Instrumentation Drawings	The project team members (there are usually more than one) must develop graphic documentation that represents the process and the instrumentation controlling that process. The documents must be correlated with the type of equipment being used on the project to insure that they are compatible. The instrumentation must also meet design pressures and temperatures as defined for the project. Thus it is necessary for the team members to update and/or modify the graphic models as the scope of the project equipment changes. In addition all new process areas that have not been addressed to date must be developed which in most cases involves a number of decisions as well as trial and error iterations.	10%
C.2.B. Schematic Wiring Diagrams	The development of the wiring diagram is a similar effort to that of the process diagram discussed in section C.2.A above. The wiring diagrams are used to document the electrical aspects of the control system. The rating of the equipment and its functional operation require the engineering group to verify the electrical design meets all requirements and safety guidelines. The graphic representation will thus change as the scope of the electrical definition for the project changes and involves a decision making process on the part of the project team members.	12%
C.2.C.	The control loop diagram is a detailed definition of the control instrumentation. It	10%

Control Loop Diagrams	must document all of the process connected instruments as well as all of the electrically connected equipment as they relate to one another on a loop by loop bases. Each loop being an entity in itself is developed to detail a particular control point in the overall plant control scheme.	
C.2.D. Logic Diagrams	Logic diagrams document the functionality of the plant logic control network. Each input and output and the intermediate control logic involved to achieve the result must be developed and documented. The arrangement of the networks must be very carefully considered as it will effect the operation of the overall plant control in relation to response time, etc."	7%

(2) At the hearing, the Division of Taxation ("Division") explained that it considered the foregoing activities taxable because it appeared to the Division that petitioner was engaging in draftsmen's activities such as producing blueprints and drawings. Prior to the hearing, the Division's Law Bureau set forth the following explanation of why it considered the foregoing items taxable:

"C.2.A.	1. Developing and verifying process and instrument circuitry graphics is not R & D. 2. Ensuring that instrumentation meets design constraints is akin to quality control. 3. Describing new process areas in graphic format is not R & D.
"C.2.B.	1. Application engineering of known data relating to wiring diagram is not R & D. 2. Verifying design against safety guidelines is akin to quality control.
"C.2.C.	Producing schematics of control loops of related instruments and of electrical connections sounds [sic] is descriptive. Sounds like creating instruction manuals.
"C.2.D.	Documenting logic control-same as C.2.C."

(3) At the hearing, petitioner's witness testified that, in the past, an engineer or technician would develop the control system using a series of sketches and then give the information to a service drafting organization which would use a CAD (computer-aided design) system to devise the process instrumentation, schematic diagrams, control diagrams and logic diagrams. Today, the engineer and technician use the CADE system to develop a control system and the diagrams are a by-product of the design and development process.

(4) Petitioner submits that C.1.A. through C.2.D. are exempt from tax under 20 NYCRR 528.11(b)(1) because the CADE system is used to develop new products and/or improve existing products.

(c)(1) Under the subtitle of Mechanical Design Engineering, petitioner asserted that the following activities, except for D.2 which is conceded taxable, were exempt from sales and use taxes:

"Item	Description	Dept. % Use
D.1 2-D Plant Layout	It is the responsibility of the Mechanical Design Engineer and the Mechanical Designer to develop process plant layouts for both proposal type work and authorized capital projects. As part of the process of developing the plant layout, equipment is arranged in various combinations to develop the most cost effective facility which includes the initial installation of plant, operation and maintenance. The above process is repeated until all the business, processes and operation constraints are met.	5%
D.2 Equipment Modeling	Once a project becomes authorized it has to be fully designed. As part of the design process, numerous pieces of equipment are selected to meet the process objectives. Once the equipment has been defined to meet the process or specifications, a mechanical piece of equipment is then	10%

	selected. This piece of mechanical equipment is either fabricated by Linde or supplied by an outside vendor. Once this has been determined, the Mechanical Design CADE operator takes the information from the equipment vendor drawing and converts that information into an electronic 3D model on the system. This process is repeated over and over again until all the mechanical components have been electronically modeled.	
D.3 Equipment Rotation and Optimization	Upon completion of the equipment modeling, the equipment is placed in its proper plant layout location. The Mechanical Designer and Mechanical Engineer then evaluate the location of the numerous pieces of equipment and determine on how to rotate or translate the piece of equipment to minimize piping runs and electrical feeder runs. This process is repeated for all the components.	5%
D.4 Pipe Routing and Optimization	Once the equipment location has been finalized, the Mechanical Design Engineer and the Mechanical Designer are responsible for routing all the process piping lines. The pipe routing must be done in such a fashion as to minimize systems pressure drop, but yet also taking constraints of the process flow philosophy. Numerous pipe routings from the various pieces of equipment are tried in order to achieve the optimum pipe routing system that will deliver the minimum installed costs along with the lowest possible system pressure drop.	40%
D.5 Solid Modeling	Sometimes it is preferred to display the 3D model as a solid as opposed to a wire frame	1%

	model, and this technique is used for that application.	
D.6 & D.7 Flexibility Analysis Pressure Drop Analysis	The Mechanical Design Engineer and Mechanical Technician perform various calculations to determine the piping flexibility and the piping system pressure drop.	4%
D.8 Interference Checking	The interference checking is a system program that is run to identify any interferences that may exist. An example of this would be a pipe running into a building wall."	2%

(2) The Division considered each of the foregoing activities taxable because it involved the layout of the manufacturing plant. Prior to the hearing, the Division provided the following explanation of why it considered the foregoing items taxable:

"D.1.A.[1]	Developing process plant layouts, even repeatedly, is application and/or design engineering, not R & D in the laboratory sense.
"D.2.A.	Picking and choosing pieces of existing equipment and arranging them to achieve an optimal solution is not R & D.
"D.3.A.	Application engineering, not R & D.
"D.4.A.	Same as D.3.A.
"D.5.A.	Not R & D in laboratory sense.
"D.6.A. & D.7.A.	Same as D.3.A.
"D.8.A.	Same as D.3.A."

(3) In item D.1, plant layout, petitioner is utilizing the capabilities of the CADE system to optimize the layout of the particular facility. Petitioner has to work with a number of constraints such as those mandated by the physical location of the plant, elevation of the plant

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[1] The corresponding items on petitioner's outline are not designated with a letter "A" under section D.

or constraints caused by the building. There may also be requirements imposed by a municipality or electrical requirements. Petitioner uses the CADE system to optimize the plan within the constraints.

(4) Before petitioner used the CADE system, it used paper cutouts to consider various configurations. This method was very limited because one could only see in two dimensions. Further, the accuracy of the method was doubtful.

(5) Petitioner concedes the item D.2, equipment modeling, is taxable. This equipment is selected by a team of people who are not using the CADE system. In order for petitioner to incorporate the specific equipment into the development of the plan, it has to be modeled three dimensionally. Therefore, petitioner has operators on the system who take the information and specifications from the equipment and develop it into a three-dimensional model. This does not improve the equipment. Rather, it provides petitioner with the basis for which to begin to develop the detailed design.

(6) Item D.4 is the activity of developing the design. Petitioner takes the models and places them into the plan layout that was developed earlier. Petitioner then begins, through trial and error, to route the various aspects of the plant.

(7) Solid modeling, D.5, is a visualization technique that allows the engineer or designer to view the design in a form that is as close to reality as can be achieved electronically. This helps provide the perspective that allows the engineer or designer to improve the product.

(8) Petitioner submits that D.1 and D.3 through D.8, inclusive, are exempt under 20 NYCRR 528.11(b)(1) because they are used to develop new products and/or improve existing products.

(d)(1) Under the title of Civil Design Engineering, petitioner asserts that the following items are exempt:

"Item	Description	Dept. % Use
E.1 through E.6 Foundation Design for Equipment, Buildings, Pipe	It is the responsibility of the Civil Engineer and Civil Designer to provide the structural engineering and	100%

Racks, Misc.	architectural and construction drawing detailing [sic] of the mentioned items. In the course of evaluating alternate architectural and structural schemes and concepts the CADE System allows rapid revision, optimization, visualization, and material quantity calculation to aid in evaluating the optimal cost effective solution(s). In combination with personal computer interface many trial-and-error options can be quickly and accurately evaluated. In the evaluation process, the impact of schemes and concepts can be merged quickly with other on-going CADE design activities from other departments to help access the relative desirability on overall project functionality, reliability and cost effectiveness.
Underground Process and Utility Piping Design	
Building Design	
Structural Steel Design	
Site Development	
Layouts	

	The merging together of site development, utility and structural steel, foundation and building models allows either visual or electronic interference checking which minimizes costly field installation interferences."

(2) It is the Division's position that in the foregoing items petitioner is taking information that was obtained from the customer's site and designing a piece of equipment that would be placed there. The Division considered these activities to be taxable because they were design engineering and not research and development in the laboratory sense despite the repeated revisions that are made to minimize costs.

(3) With respect to civil design engineering, petitioner must consider the topography of a particular site. There are various options available to the civil designer in terms of how he or she wants to configure the civil aspect of the plant, such as the placement of the foundation, the amount of steel or the configuration of the steel. The CADE system provides the civil engineer and the civil designer the opportunity to try various cases and configurations and determine what is optimum given the fact that it must conform to the physical constraints that are imposed by the site selection. That is, one is looking from the standpoint of the cost of the foundation, the schedule of the foundation and making sure that the foundation satisfies the load-bearing requirements of the particular facility.

(4) Petitioner submits that items E.1 through E.6 are exempt from tax under 20 NYCRR 528.11(b)(1) because they are used to develop new products and/or improve existing products.

(e)(1) Petitioner listed the following items under Electrical Design Engineering:

"Item	Description	Dept. % Use
F.1.A Layout Switchgear Bldg. and Related Electrical Equipment	Once equipment is modeled make [sic] a layout to achieve optimum utilization of space, by arranging and rearranging equipment relationships. This is essentially a trial and error process until an optimum	5%

	relationship is found.	
F.2.A Underground Conduit Design	Layout of underground conduit duct banks for optimum cost savings of conduit and concrete. Then rearrange and improve routing so as to avoid underground obstacles such as foundations, water lines and etc.	20%
F.3.A Ground Grid	Develop a ground grid consisting of ground wires and ground rods to provide sufficient equipment grounding, achieving loops as much as possible while still considering economics.	5%
F.4.A Cable Tray Design	Layout cable using as many common mechanical pipe supports as possible. This results in rearranging the layout so that cable tray does not hit any obstacles. Rerouting is also done to improve the economics of the system.	20%
F.5.A Aboveground Power and Control Design	Using the electronic communications between the mechanical design and electrical to locate motors, and instruments, to improve routing to obtain shortest distances."	45%

(2) At the hearing, the Division explained that it considered electrical design engineering, F.1.A through F.5.A, as taxable because petitioner was just developing sets of drawings or blueprints as an end product. Prior to the hearing, the Division stated that it considered F.1.A. through F.5.A. taxable for the same reason it considered E.1 through E.6 taxable.

(3) In these activities, the engineer is using the CADE system to develop the design. When one looks at the activity, such as routing of conduit, examining cable tray design and aboveground power and control design, the engineer who is involved in these activities is using the CADE system to try various combinations of routing and materials. Through trial and error,

the engineer is using the system to provide the analysis of what is deemed to be an improved configuration of the layout.

(4) It is petitioner's position that items F.1.A through F.5.A are exempt from tax under 20 NYCRR 528.11(b)(1) because they are used to develop new products and/or improve existing products. Petitioner uses the CADE system to produce a product which meets its high standards.

(f)(1) Under the title of Cold Box Engineering, petitioner listed the following items which it considered exempt from tax:

"Item	Description	Dept. % Use
H.1.A,B,C Conceptual Cold Box Configuration	Conceptual Cold Box Configuration. For each new cold box design, a 2-D conceptual configuration is required. To develop this configuration, equipment shapes and schematic piping drawings are made. It is the Engineer's responsibility to optimize the cold box layout while maintaining the functional requirements of the process. The procedure involves manipulating the layout to achieve the cost-effective assembly recognizing shipping, manufacturing, and process constraints.	1%

H.2.A Model 3-D Equipment Shapes	In preparation of developing the detailed layout of a cold box, equipment shapes are modelled 3-D and located in the cold box. Once located, configuration optimization of vessels (storage tanks, separators) within the constraints listed in H.1.A, B, C, takes place.	2%
H.2.B,C Develop 3-D Piping Routing and Perform Pipe Flexibility Analysis	The major engineering and design effort in developing the detailed layout of a cold box is the 3-D pipe routing and associated flexibility analysis of all process piping. The Designer's responsibility is to route the piping optimally while avoiding potential interferences. Using the CADE system, a trial and error procedure is used until a satisfactory routing is established. Once a routing is determined, the Engineer performs his flexibility analysis. Nearly 100% of the pipes will require rerouting due to either too much (meaning the routing can be further optimized) or too little flexibility exists. The Designer will then reconfigure the piping to accommodate the analysis. This trial and error procedure (tempered with engineering judgment) is repeated until an optimized routing is obtained. Incorporated into this analysis is the determination of pipe support locations. Pipe supports put further constraints on flexibility analysis. The Engineer selects support locations and inputs these constraints into the flexibility analysis. Through the analysis, further trial and error is required to optimally	36%

	locate the supports while still maintaining a flexible system.	
H.2.D,E Model Major Equipment Supports and Perform Interference Checking	Major equipment supports are modelled 3-D in the cold box assembly. The space limitations are dictated by the configuration of piping and equipment. Optimization of the physical support member size versus the allocated space is determined by performing the interference checking routine on the CADE system. This routine allows the Designer (through trial and error) to input various support member sizes to determine a configuration that maintains proper clearances.	7%
H.2.F Pressure Drop Analysis	Once the piping system is completed, including interference checking and flexibility analysis, the CADE system is used to determine process piping pressure drops based upon the pipe configuration. Further optimization of the piping system may be required to meet the process requirements.	3%
H.3 Fabrication Details for Cold Box	Once the piping assembly configuration is complete, fabrication details are developed. These details are CADE developed and are generated to complete the final cold box assembly.	
H.3.A Final Pipe Assembly Design	The final pipe assembly details include the labelling, dimensioning, locating pipe supports, etc., to make the assembly drawing complete.	12%
H.3.B Final Casing and Equipment Support Design	The final casing and equipment support details are generated.	3%
H.3.C	Small instrument lines are routed. The routing is	3%

Instrument Lines	schematically done on the CADE system."

(2) At the hearing, the Division explained that it disallowed the items pertaining to cold box engineering because it considered these activities site work. Except for item H.3.A., the Division stated, prior to the hearing, that it considered the foregoing activities as design engineering and not research and development. With respect to item H.3.A., the Division stated that "preparation of final drawings of design engineering is not R & D."

(3) The items in issue pertaining to cold box engineering involve taking into account the expansion and contraction of material as temperatures progress from cryogenic to elevated levels. Using the CADE system, petitioner devises the optimum routing of the piping. Cold box engineering is the most critical part of the air separation units because it is where the separation of air occurs.

(4) Petitioner maintains that items H.1.A. through H.3.C. are exempt from tax under 20 NYCRR 528.11(b)(1) because they are used to develop new products and/or improve existing products.

The activities being focused upon allowed petitioner to improve the design to either provide a greater competitive advantage or to improve petitioner's ability to satisfy customers' expectations. The CADE system allows petitioner to determine optimum designs.

On the basis of its analysis, petitioner determined that it used the CADE system in research and development 64.6% of the time. It obtained this percentage by adding the percentages obtained by multiplying the percentage use of each application by the percentage of the total CADE system that each department uses.

The Division's Technical Services Bureau issued an Advisory Opinion, dated January 15, 1988, to Union Carbide Corporation regarding the availability of a sales tax research and development exemption under Tax Law § 1115(a)(10) for CADE equipment. The substantive opinion was as follows:

> "The use of computer equipment has already been recognized as qualifying for the research and development exemption under certain circumstance [sic]. In HOUDAILLE Industries, Inc., Advisory Opinion of the State Tax Commission,

May 1, 1985, TSB-A-85(13)S, it was determined that:

> "The use of the CAD/CAM by Petitioner to draw the relative dimensions of machine parts pursuant to customer request as described above contains no element of research and development and is nothing more than the ordinary design and drafting of machine parts. However, the use by Petitioner of the CAD/CAM for purposes of experimenting with different configurations to test the ability of the configurations to comply with design standards falls within the purview of Example 4 as cited above and is, therefore, deemed to be used directly in research and development.
>
> "Clearly, to the extent that the C.A.D.E. equipment is used to perform research and experimentation to develop better and more efficient production equipment, it is being used to advance the technology in a technical field of endeavor within the meaning of regulation section 528.11(b)(1).
>
> "However, to qualify for exemption, the C.A.D.E. equipment must be used predominantly (over 50% of the time) in research and development. If the C.A.D.E. equipment is used more than 50% of the time in activities other than research it does not qualify for exemption. For example, the use of C.A.D.E. equipment for ordinary design and drafting functions does not qualify as research and development in the experimental or laboratory sense. Moreover, the use of C.A.D.E. equipment to establish facility configurations or to modify facilities to conform to the topography of the customer's land site does not qualify as research and development in the experimental or laboratory sense.
>
> "Additionally, to qualify for exemption, the C.A.D.E. equipment must be used directly in research and development. Usage in activities collateral to research and development (e.g. administrative and management functions) does not qualify as research and development.
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> "Accordingly, if the C.A.D.E. equipment is used directly and predominantly (more than 50% of the time) for qualified purposes, it will qualify for the exemption provided by section 1115(a)(10) of the Tax Law."

SUMMARY OF THE PARTIES' POSITIONS

It is petitioner's position that the use of the CADE system in designing air separation plants qualifies as research and development in the experimental or laboratory sense within the meaning of the Tax Law. Petitioner buttresses its argument with references to three Advisory Opinions: Peerless-Winsmith, Inc., February 19, 1992; Sybron Corporation, May 14, 1985; and Houdaille Industries, Inc., May 1, 1985. Petitioner asserts that its CADE system is used in more experimental analysis than the CAD/CAM computers involved in the cited Advisory Opinions.

Petitioner next argues that it used the CADE system in qualifying research and development activities more than 50% of the time. Petitioner supports this argument through a review of its witnesses' testimony.

Lastly, petitioner maintains that neither the testimony of the Division's witnesses nor the documentary evidence submitted by the Division at the hearing can be given any weight. This argument is premised on the lack of engineering expertise or experience of the Division personnel who were involved with this matter.

In response to the foregoing, the Division submits that the activities performed by petitioner are not qualifying research and development activities. The Division contends that the CADE system is being used to optimize plant layout and design and that this activity is not basic research. The Division contends that this is strictly an engineering activity which takes basic research done elsewhere and applies it and other existing knowledge to a specific set of facts. The Division's brief proceeds to review portions of the Internal Revenue Code and a pronouncement of the Financial Accounting Standards Board to support its position that the activities being performed by the CADE system do not meet any of the definitions of "research and development in the experimental or laboratory sense."

The Division also contends that petitioner has not demonstrated that the CADE system is being used more than 50% of the time in qualifying research and development activities. The Division submits that the Advisory Opinion issued to petitioner is not controlling because it omits many relevant factors such as that petitioner has a separate research and development department which does not utilize the CADE system. The Division also submits that the Advisory Opinion issued to petitioner does not note that only existing component technology would be used by the CADE system in the design of each manufacturing plan. The Division concludes that it reviewed petitioner's list of activities and concluded that less than 50% were qualifying research and development activities. The Division posits that most of the activities are similar to the activities that a draftsman or architect would perform in designing a plant and that these activities do not qualify for an exemption.

In reply, petitioner argues that its activities come within the meaning of research and development as found within Tax Law § 1115(a)(10) and 20 NYCRR 528.11(a)(1). Petitioner avers that it meets these definitions through advancing the technology in a scientific or technical

field of endeavor, the development of new products and the improvement of existing products.

Petitioner also contends that additional authority for the meaning of the term of research and development can be found in the Advisory Opinions cited earlier. Petitioner submits that, in light of the foregoing authority, the Division's reliance upon Federal tax law and accounting standards is inappropriate and irrelevant.

Petitioner next argues that the Division misstates both petitioner's and the Division's statement of the issues at the hearing. Petitioner contends that the issues are whether the CADE system qualifies for exemption from sales tax as equipment used in research and development and whether the equipment is used predominantly in research and development for more than 50% of the time.

Lastly, petitioner argues that it is irrelevant that petitioner has a research and development department which is separate from the engineering department and that only the latter uses the CADE system.

CONCLUSIONS OF LAW

A. Tax Law § 1115(a)(10) exempts "[t]angible personal property purchased for use or consumption directly and predominantly in research and development in the experimental or laboratory sense." The meaning of the term "research and development", as set forth in Tax Law § 1115(a)(10), is defined in the Commissioner's regulations as follows:

> "(b) Research and development. (1) Research and development, in the experimental or laboratory sense, means research which has as its ultimate goal:
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> "(i) basic research in a scientific or technical field of endeavor;
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> "(ii) advancing the technology in a scientific or technical field of endeavor;
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> "(iii) the development of new products;
>
> "(iv) the improvement of existing products; and
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> "(v) the development of new uses for existing products." (20 NYCRR 528.11[b].)

B. The first question presented is what standard should be employed for determining whether petitioner's activities constitute research and development in the experimental or

laboratory sense. The Division contends that it is useful to refer to provisions of the Internal Revenue Code and pronouncements of the Financial Accounting Standards Board. Petitioner maintains that present New York authority is sufficient to resolve the matter and therefore to resort to other sources is inappropriate.

C. On the basis of Matter of Modern Refractories Serv. Corp. (Tax Appeals Tribunal, December 15, 1988, confirmed 164 AD2d 69, 563 NYS2d 200), it is concluded that prevailing New York authority is sufficient to resolve the issues presented and, further, that the activities in issue do not constitute research and development in the experimental or laboratory sense.

D. In Modern Refractories, the petitioner was in the business of installing and servicing refractory products. Prior to the period in issue, the petitioner was asked by a customer whether it could develop a system which enabled the servicing of furnaces or ovens while still hot. This led the corporation to develop the Hot Suit System. This innovation included the use of a suit of protective material which permitted repairs and servicing to be done without extended interruption in the customer's production. Before the development of the Hot Suit System, refractory servicing and repair required a shutdown of the customer's facility in order to permit the furnaces and ovens to cool. The cooling down and subsequent start-up consumed a significant amount of production time. The Hot Suit System enabled repairs and servicing to be performed without an extended interruption in production, thereby improving profitability. The petitioner developed the Hot Suit System primarily through on-the-job, trial-and-error testing.

The Tax Appeals Tribunal concluded that the petitioner did not meet the criteria of Tax Law § 1115(a)(10) that the properties be used "directly", "predominantly" and "in the experimental or laboratory sense". The Tribunal reasoned that since the petitioner admitted that its research of the suit and the performance of cleaning services occurred during the same period of time, then to meet the "direct use" requirement it had to also show at what times the research occurred independent of the cleaning work. The petitioner did not meet this burden.

Similarly, since there was no particular time at which the materials were used solely for research and development, it could not be said that they were used "predominantly" for research

and development over 50% of the time as required by 20 NYCRR 528.11(c)(2).

Finally, the Tribunal found that the hot suit research was not done "in the experimental or laboratory sense" when it was done at the same time as its cleaning service.

On the Article 78 proceeding which followed, the determination of the Tribunal was confirmed. The court stated:

> "The Tribunal could reasonably conclude, consistent with the language of both the statute and regulations, that once a product's development reaches the stage of being capable of operational use and is actually so used in commercial operations, the research and development exemption for product purchases related to such operations no longer applies. At the least, any further research and development in such commercially operational use can hardly be deemed to be performed 'in the experimental or laboratory sense' (Tax Law § 1115[a][10])." (Modern Refractories Serv. Corp. v. Dugan, 164 AD2d 69, 563 NYS2d 200, 201.)

The court also held that since the petitioner had not explained why the research and development of the hot suit system could not be conducted under conditions other than commercial operations, it was rational to consider such activities as collateral and not research and development (id., 563 NYS2d at 201).

E. In this matter, it is clear that all of the activities in issue were conducted by petitioner's engineering division as part of its commercial operation of designing gas separation plants. Under these circumstances, further research and development in a commercially operational use cannot be considered "in the experimental or laboratory sense" (Tax Law § 1115[a][10]; see, Matter of Modern Refractories Serv. Corp. v. Dugan, supra, 563 NYS2d at 201; see also, National Fuel Gas Distribution Corp., Tax Appeals Tribunal, March 14, 1991 [which noted that the use of an item for research and development in the experimental or laboratory sense is mutually exclusive with the use of an item to render commercial services]). Furthermore, as in Matter of Modern Refractories Serv. Corp. v. Dugan (supra), petitioner has not explained why research and development of the air separation plant could not be conducted in other than commercial operations for a customer such as in its research and development department. Therefore, the activities involved herein are collateral and not used directly in research and development as required by 20 NYCRR 528.11(c) (Matter of Modern Refractories Serv. Corp. v. Dugan, supra, 563 NYS2d at 201).

F. In view of the foregoing, it is clear that petitioner has not established that it used its CADE system more than 50% of the time in qualifying research and development activities. In reaching the foregoing conclusion, it is recognized that there may be a conflict between the Advisory Opinions relied upon by petitioner and the determination herein. This possible conflict does not warrant a different result because Advisory Opinions are binding on the Division only with respect to the particular taxpayer that petitioned for the Advisory Opinion (Tax Law § 171[24]). Thus, Advisory Opinions do not have the precedential value of a decision of the Tax Appeals Tribunal or the Appellate Division. Further, the Advisory Opinion which was issued to petitioner was vague and not directed to any of the specific items listed in this determination.

G. The petition of Union Carbide Corporation is denied.

DATED: Troy, New York
July 21, 1994

/s/ Arthur S. Bray
ADMINISTRATIVE LAW JUDGE